

DRAFT MARCH 1997

**STORAGE AND CONVEYANCE
COMPONENT CONFIGURATIONS FOR THE PROGRAMMATIC
EIR/EIS ALTERNATIVE ANALYSIS**

Introduction

During Phase I, the CALFED Bay-Delta Program has identified three alternative solutions. Each alternative may be implemented in a wide range of potential configurations. This report documents the various configurations of storage and conveyance components suggested as a basis for programmatic impact evaluation. These alternative configurations for each of the three CALFED alternatives are suggested in order to explore a reasonable range of facilities, costs, and impacts in the Programmatic EIR/EIS. Each of the alternative configurations are designed to be consistent with the Program mission statement, the primary solution principles, and the program objectives.

It is important to emphasize that the configurations described in this report are subject to change based on input from stakeholders and the public prior to initiation of formal impact evaluation.

The mission of the CALFED Bay-Delta Program is to develop a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The primary objectives of the Program are:

- To provide good water quality for all beneficial uses;
- To improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species;
- To reduce the mismatch between Bay-Delta water supplies and current and projected beneficial uses dependent on the Bay-Delta system; and
- To reduce the risk to land use and associated economic activities, water supply, infrastructure, and the ecosystem from catastrophic breaching of Delta levees.

In Phase II, from June 1996 to September 1998, the Program will conduct a broad-based environmental and pre-feasibility review of the three alternative solutions and will identify the one preferred alternative.

The Solution principles state that a Bay-Delta Solution must:

- Reduce conflicts in the system,
- Be equitable,
- Be affordable,
- Be durable,
- Be implementable, and
- Have no significant redirected impacts.

The objectives of the program are to improve:

- Ecosystem quality,
- Water quality,
- Water supply reliability, and
- Levee system integrity.

All three alternatives include the four common programs related to:

- Water use efficiency,
- Ecosystem restoration,
- Water quality, and
- Levee system integrity.

Overview of Alternative Configurations

The three Alternatives differ according to the type of Delta storage and conveyance configuration they have.

Alternative 1 - Existing System Conveyance where little or no modifications are made to flow capacity of the existing Delta channels. The alternative has three configuration numerated from 1A to 1C.

Alternative 2 - Through Delta Conveyance where a variety of modification to Delta channels could be made to increase the conveyance efficiency and capacity. The alternative has five configurations numerated from 2A to 2E.

Alternative 3 - Dual Delta Conveyance where a combination of improved through Delta conveyance and isolated facility conveyance are used to increase the flexibility of the conveyance efficiency. The alternative has seven configurations from 3A to 3G.

Chart 1A and 1B show tables listing the components of the different configurations of each alternative. Chart 2 shows the physical components in a matrix format. Detailed alternative descriptions follow the charts.

CHART 1-A
COMPONENT CONFIGURATIONS A-D

	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
CONFIGURATION A	Re-Operation	North Delta Improvements 10,000 cfs Hood Intake South Delta Improvements	5,000 cfs Open Channel IF North Delta Improvements South Delta Improvements
CONFIGURATION B	Re-Operation CVP-SWP Improvements	North Delta Improvements 10,000 cfs Hood Intake South Delta Improvements CVP-SWP Improvements 3.0 MAF Upstream Sto. (Sac River Tribs.) 2.0 MAF Aqueduct Sto. 200 TAF In-Delta Sto. 500 TAF Groundwater Sto. (Sac Valley) 500 TAF Groundwater Sto. (San Joaquin Valley)	5,000 cfs Open Channel IF North Delta Improvements South Delta Improvements CVP-SWP Improvements 3.0 MAF Upstream Sto. (Sac River Tribs.) 500 TAF Upstream Sto. (San Joaquin Tribs.) 2.0 MAF Aqueduct Sto. 200 TAF In-Delta Sto. 500 TAF Groundwater Sto. (Sac Valley) 500 TAF Groundwater Sto. (San Joaquin Valley)
CONFIGURATION C	Re-Operation South Delta Improvements CVP-SWP Improvements 3.0 MAF Upstream Sto. (Sac River Tribs.) 1.0 MAF Aqueduct Sto. 500 TAF Groundwater Sto. (Sac Valley) 500 TAF Groundwater Sto. (San Joaquin Valley)	Western 15,000 cfs Isolated South Delta Intake Northern 15,000 cfs Isolated South Delta Intake Eastern 15,000 cfs Isolated South Delta Intake CVP-SWP Improvements	5,000 cfs Pipe IF North Delta Improvements South Delta Improvements
CONFIGURATION D	N/A	10,000 cfs Hood Intake Mokelumne River Floodway (East) East Delta Habitat South Delta Habitat CVP-SWP Improvements 2.0 MAF Aqueduct Sto.	5,000 cfs Pipe IF North Delta Improvements South Delta Improvements CVP-SWP Improvements 3.0 MAF Upstream Sto. (Sac River Tribs.) 2.0 MAF Aqueduct Sto. 200 TAF In-Delta Sto. 500 TAF Upstream Sto. (San Joaquin Tribs.) 500 TAF Groundwater Sto. (Sac Valley) 500 TAF Groundwater Sto. (San Joaquin Valley)

CHART 1-B **COMPONENT CONFIGURATIONS E-H**

	ALT. 1	ALTERNATIVE 2	ALTERNATIVE 3
CONFIGURATION E	N/A	<p>Tyler Island Habitat Mokelumne River Floodway (West) East Delta Habitat South Delta Habitat CVP-SWP Improvements 3.0 MAF Upstream Sto. (Sac River Tribs.) 500 TAF Upstream Sto. (San Joaquin Tribs.) 2.0 MAF Aqueduct Sto. 500 TAF Groundwater Sto. (Sac Valley) 500 TAF Groundwater Sto. (San Joaquin Valley)</p>	<p>15,000 cfs Open Channel IF North Delta Improvements CVP-SWP Improvements 3.0 MAF Upstream Sto. (Sac River Tribs.) 500 TAF Upstream Sto. (San Joaquin Tribs.) 2.0 MAF Aqueduct Sto. 200 TAF In-Delta Sto. 500 TAF Groundwater Sto. (Sac Valley) 500 TAF Groundwater Sto. (San Joaquin Valley)</p>
CONFIGURATION F	N/A	N/A	<p>Chain of Lakes North Delta Improvements CVP-SWP Improvements 3.0 MAF Upstream Sto. (Sac River Tribs.) 500 TAF Upstream Sto. (San Joaquin Tribs.) 2.0 MAF Aqueduct Sto. 500 TAF Groundwater Sto. (Sac Valley) 500 TAF Groundwater Sto. (San Joaquin Valley)</p>
CONFIGURATION G	N/A	N/A	<p>5,000 cfs Screened Deep Water Ship Channel and West Delta Tunnel North Delta Improvements CVP-SWP Improvements 3.0 MAF Upstream Sto. (Sac River Tribs.) 500 TAF Upstream Sto. (San Joaquin Tribs.) 2.0 MAF Aqueduct Sto. 200 TAF In-Delta Sto. 500 TAF Groundwater Sto. (Sac Valley) 500 TAF Groundwater Sto. (San Joaquin Valley)</p>
CONFIGURATION H	N/A	N/A	<p>5,000 cfs Open Channel IF Tyler Island Habitat Mokelumne River Floodway (West) East Delta Habitat South Delta Habitat CVP-SWP Improvements 3.0 MAF Upstream Sto. (Sac River Tribs.) 500 TAF Upstream Sto. (San Joaquin Tribs.) 2.0 MAF Aqueduct Sto. 500 TAF Groundwater Sto. (Sac Valley) 500 TAF Groundwater Sto. (San Joaquin Valley)</p>

Groundwater Storage and Conjunctive Use Components

CALFED is committed to exploring opportunities for groundwater banking and in-lieu conjunctive use of groundwater resources. However, the potential for CALFED involvement in groundwater banking and in-lieu conjunctive use creates concerns for counties and for the local water agencies where the programs might be implemented. Although direct construction impacts are generally less than for surface storage facilities, there is a potential for affecting domestic well, farm operations, stream flow, habitat, towns and cities. In direct response to local concerns to this issue, the Program's first priority is to listen carefully to concerns and interests and look for opportunities where there is local interest, and the potential to combine local and statewide benefits. The second priority is to develop pilot programs which demonstrate that assurances can be established. The assurances must protect local interests while promoting common benefits to counties and local water agencies, hand-in-hand with system water supply reliability benefits. Therefore, although groundwater components are included in a number of alternative configurations, CALFED recognizes the ongoing need to coordinate closely with all affected parties in the alternative refinement process.

Linkages

CALFED staff has sought to incorporate a range of components broad enough to encompass the interests of CALFED agencies and stakeholders, without making any pre-determinations regarding preferred alternative configurations. At the same time, staff has given some consideration to linkages (i.e. potential benefits and impacts for a wide range of resource categories). Some of the key linkages are listed below, without regard to priority:

- Flood risk
- Water quality
- Water supply reliability
- Fisheries: First paradigm--Keep fish in the Sacramento River by screening diversions from the river
- Fisheries: Second paradigm-- Make the interior Delta more hospitable to anadromous fish by creating slow-moving cross-Delta flow with a large and diverse expanse of habitats
- Utilities: Pipelines, radio towers, gas wells, power lines, etc.
- Transportation: Highways and bridges
- Land use, agriculture, and wildlife habitat: First paradigm-- Minimize change in Delta configuration and loss of agricultural land from production. Preserve current agricultural land for its wildlife habitat value. Allow market forces and cooperative management agreements to dictate land use patterns.
- Land use, agriculture, and wildlife habitat: Second paradigm-- Seek extensive conversion of agricultural land to open water, shallow water habitat, riparian forest, wetlands, and dedicated wintering waterfowl habitat because it represents a net improvement in environmental quality. Recognize that current agricultural trends in Delta region include rapid loss of pasture and row crops to viticulture, decreasing concentrations of waste grain due to better harvesting techniques, and urbanization.
- Topography (Hills, land surface elevations, etc.)
- Geology: seismic risk, soils, foundation conditions, depth of peat

- Sociological impacts: Presence of cities, farms, and other infrastructure along facilities alignments. Compatibility with local land use plans (example: San Joaquin County plans for population growth on New Hope Tract)
- Recreation: Separation of recreationists from landowners, channel island destination sites, separation of fast and slow boat traffic, boat wakes, law enforcement
- Navigation: Preservation of navigation access for levee repair, commerce, and recreation
- Climatic effects: Wind waves, sea surface rise
- Seepage: Impacts on areas adjacent to flooded areas

Adaptive Management

The range of components described in the following pages offer various levels of flexibility in terms of incremental implementation and responding to changes in the Bay-Delta system and our understanding of it. Some physical and operational changes are readily implemented in small steps (i.e. creation of desirable habitats). Others, such as channel modifications for flood control, must be made with the total system response in mind, to prevent shifting a problem from one area to another. Adaptive management embodies these concepts, and should be kept in mind when refining components and alternative configurations. The reader may wish to ask:

- Is the component or alternative configuration amenable to incremental implementation?
- How easily can one backtrack or take a different approach if expected results do not occur?

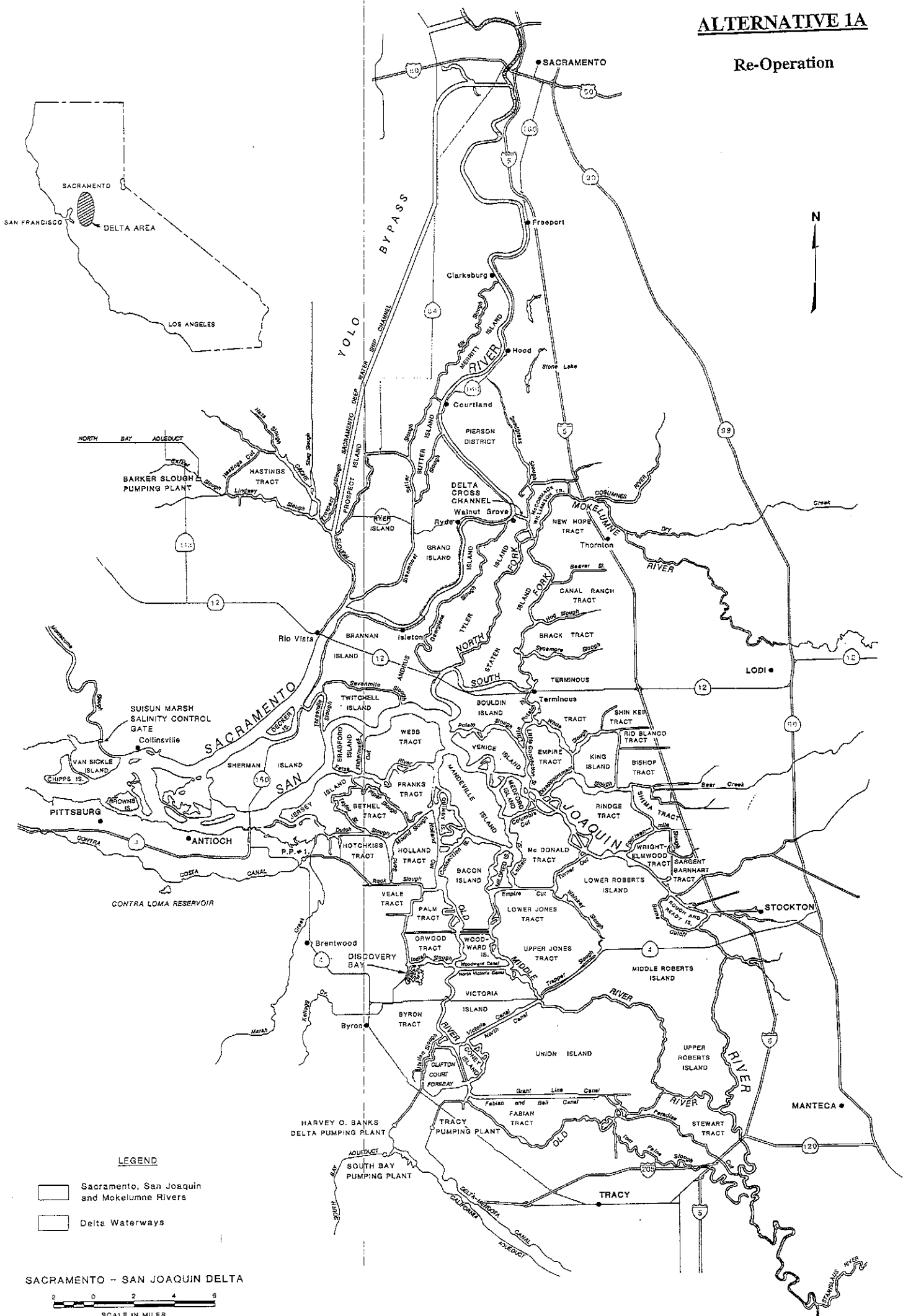
Common Assumptions

In order to complete prefeasibility cost estimates with the appropriate level of effort, the following conceptual design assumptions are made:

- Levee slopes: 3:1 on land and water sides, unless otherwise noted
- On the water side of new setback levees it is assumed that a riparian berm of about 20-foot width, at +2 MSL, is provided.
- Water side slopes are protected against erosion by a layer of construction fabric and rip-rap, up to the 100-year flood design elevation, except for the water side berm horizontal surface, which is vegetated.
- Where new setback levees are constructed on unconsolidated peat, assume 50 % additional levee material is required to consolidate foundations
- For isolated open channel construction assume side slopes 1:8 to a depth of 3 feet below normal water surface elevation, then 1:3 side slopes to a maximum depth of 30 feet, 15 foot wide waterside berm, levees 1:3 side slopes, 20-foot crown width on levees.
- Wherever islands or tracts are permanently flooded, seepage interception wells are assumed to be required on adjacent islands or tracts to mitigate for increased seepage.
- Whenever existing levees are breached to create new channels and flooded areas it is assumed that they will remain in all areas except where the breaches are specified, to provide wave wash protection for adjacent islands, habitat areas, and recreation destination sites. The land side of the breached levees must be protected against erosion by using construction fabric and rip rap, up to 2 feet above mean high tide.

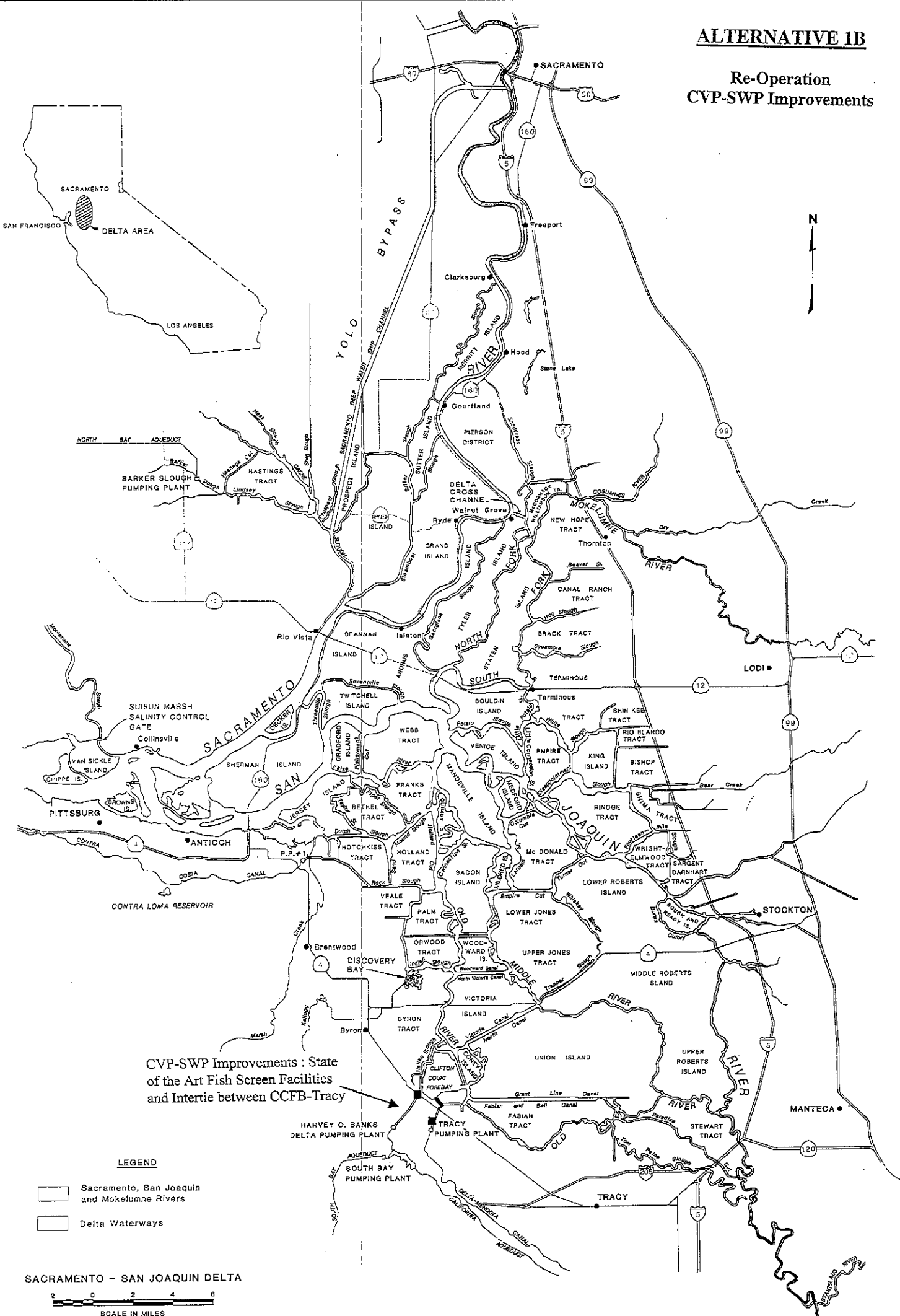
ALTERNATIVE 1A

Re-Operation



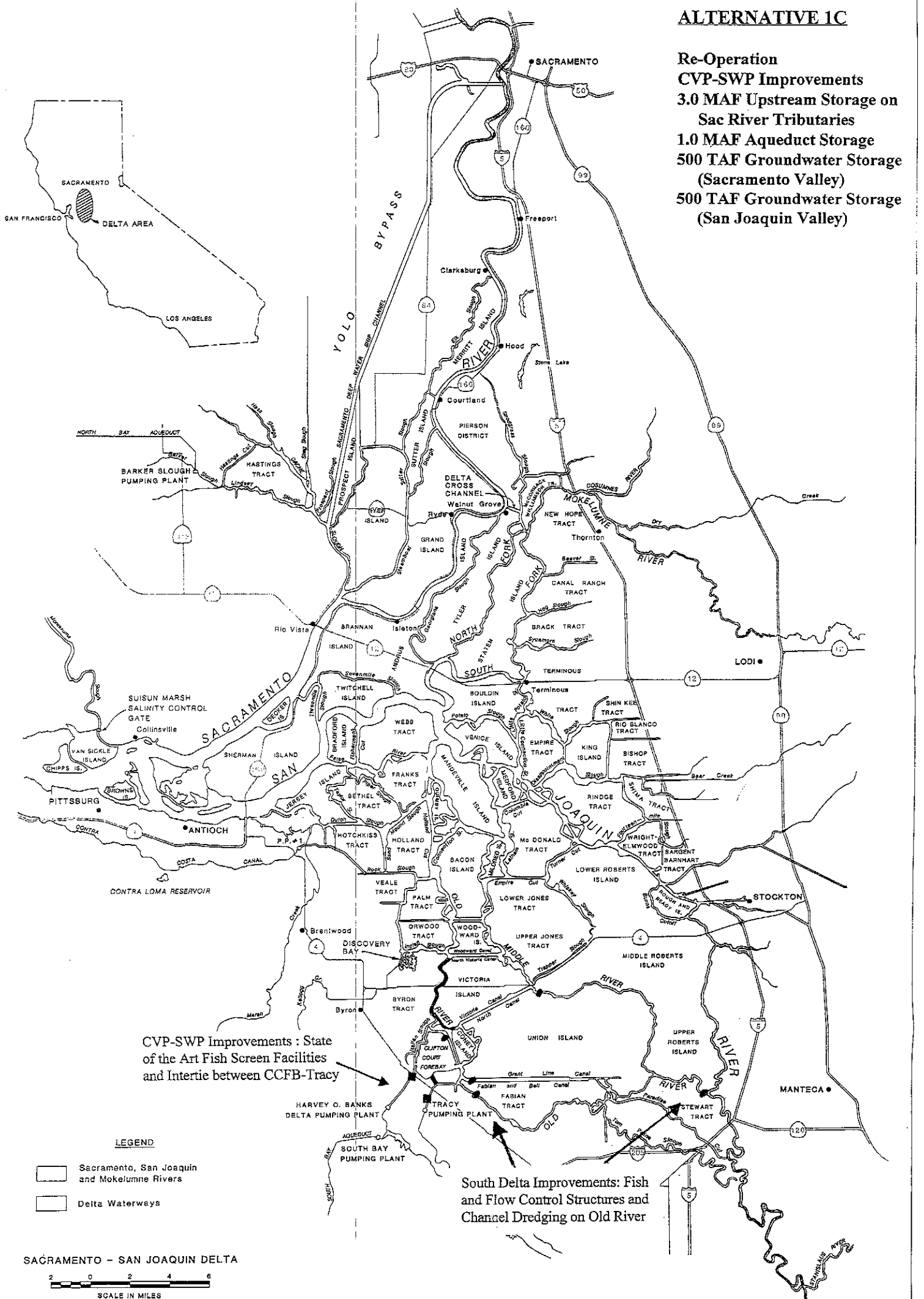
ALTERNATIVE 1B

Re-Operation
CVP-SWP Improvements



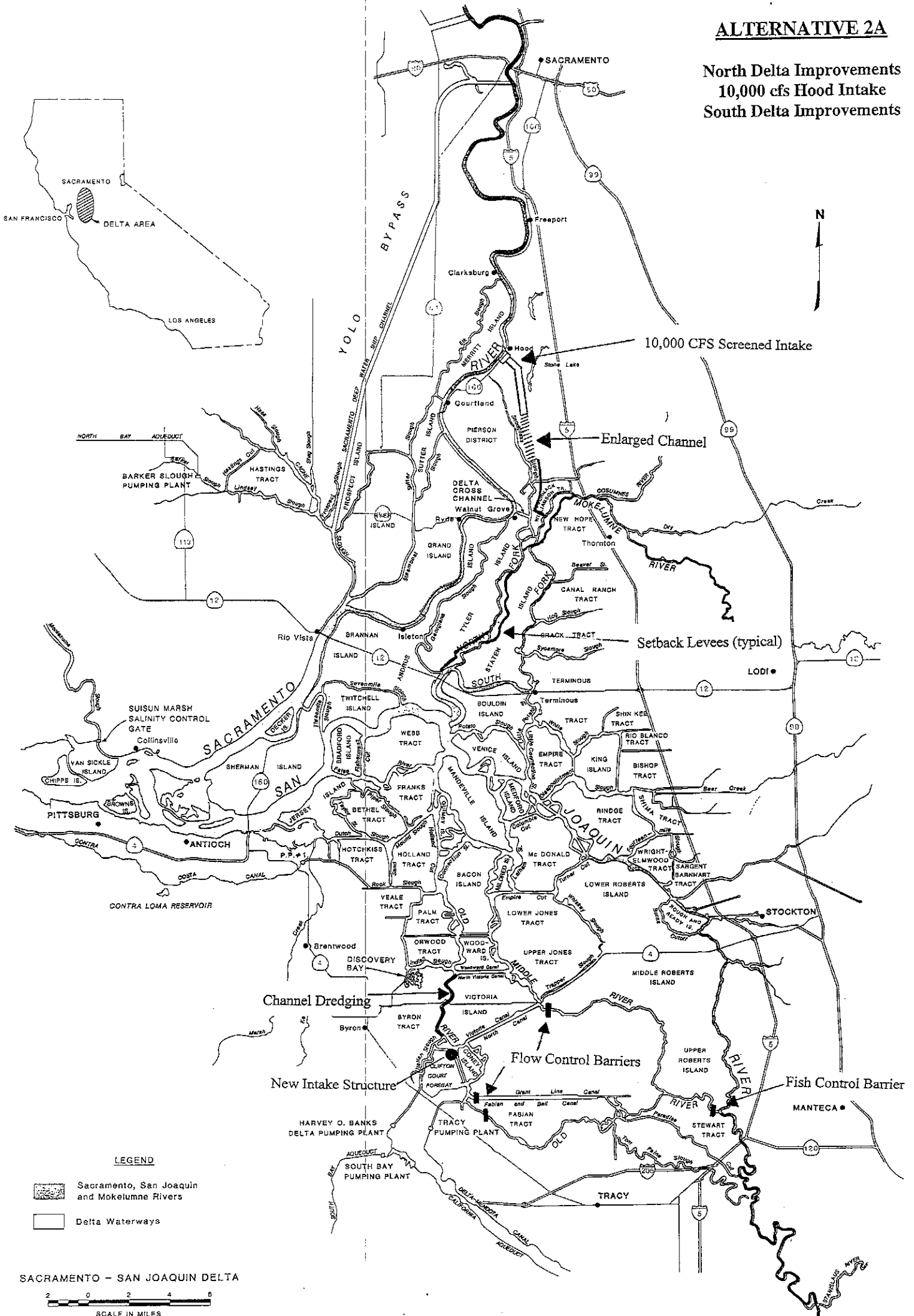
ALTERNATIVE 1C

Re-Operation
CVP-SWP Improvements
3.0 MAF Upstream Storage on
Sac River Tributaries
1.0 MAF Aqueduct Storage
500 TAF Groundwater Storage
(Sacramento Valley)
500 TAF Groundwater Storage
(San Joaquin Valley)



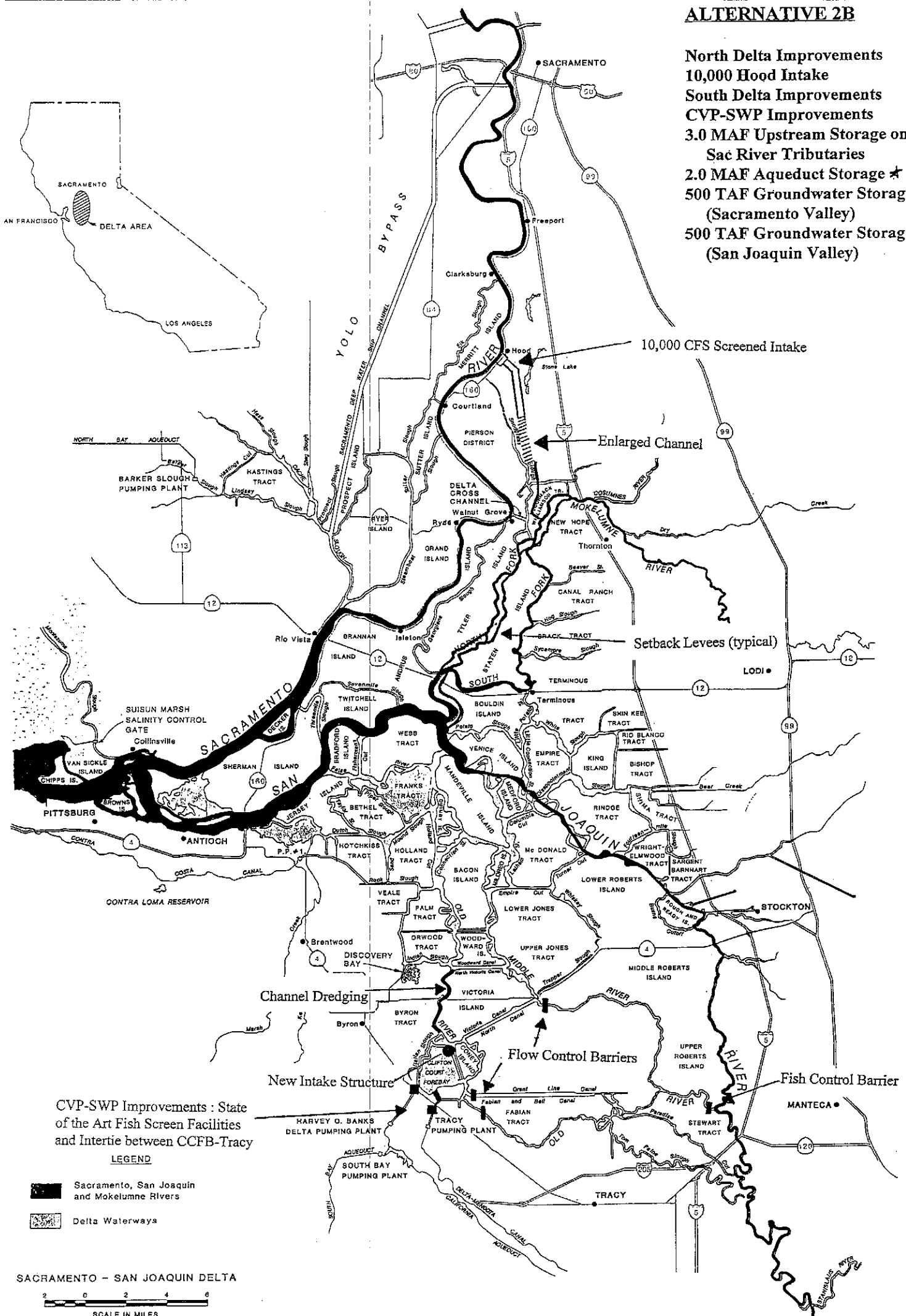
ALTERNATIVE 2A

North Delta Improvements
10,000 cfs Hood Intake
South Delta Improvements



ALTERNATIVE 2B

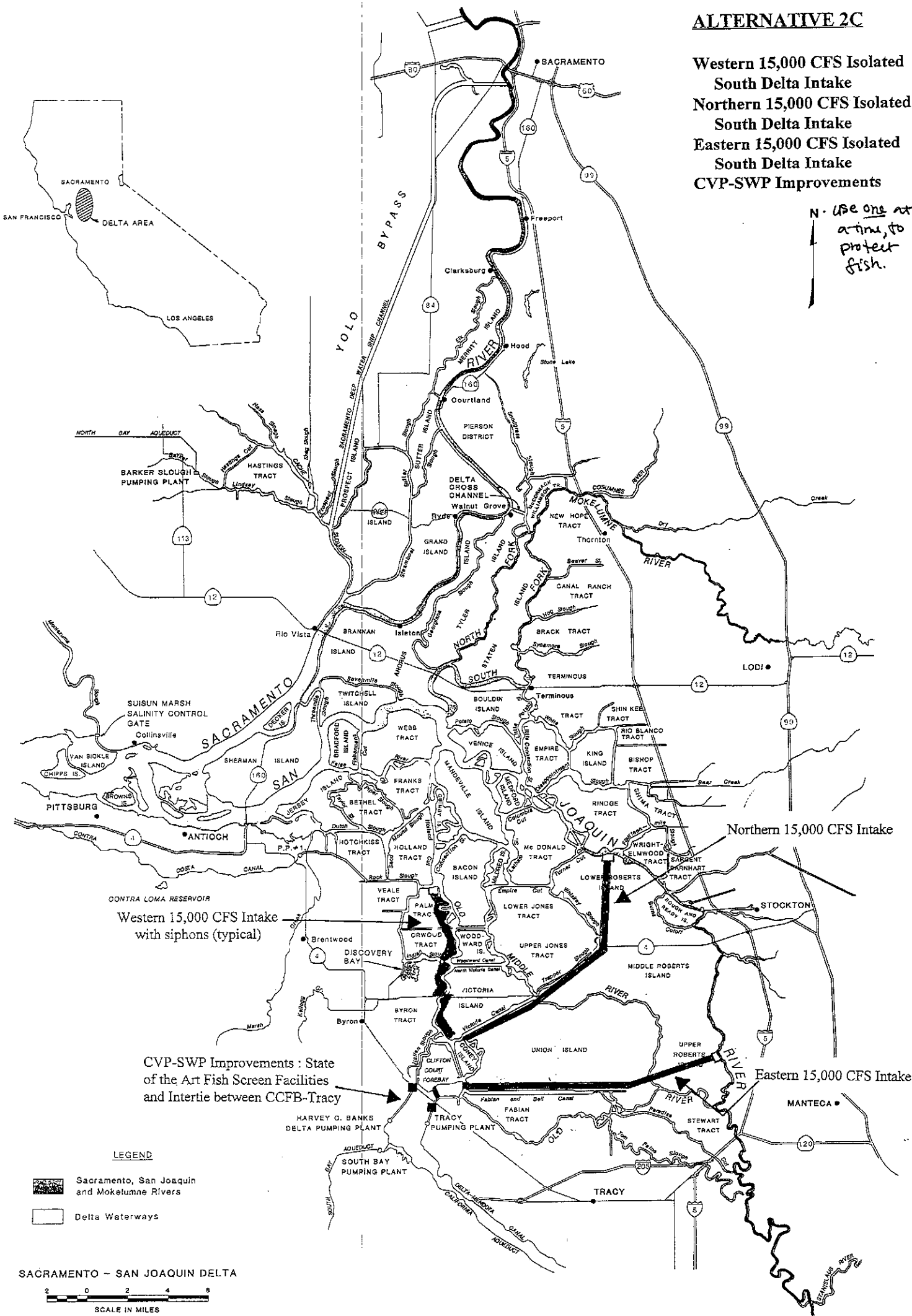
North Delta Improvements
 10,000 Hood Intake
 South Delta Improvements
 CVP-SWP Improvements
 3.0 MAF Upstream Storage on
 Sac River Tributaries
 2.0 MAF Aqueduct Storage ★
 500 TAF Groundwater Storage
 (Sacramento Valley)
 500 TAF Groundwater Storage
 (San Joaquin Valley)



ALTERNATIVE 2C

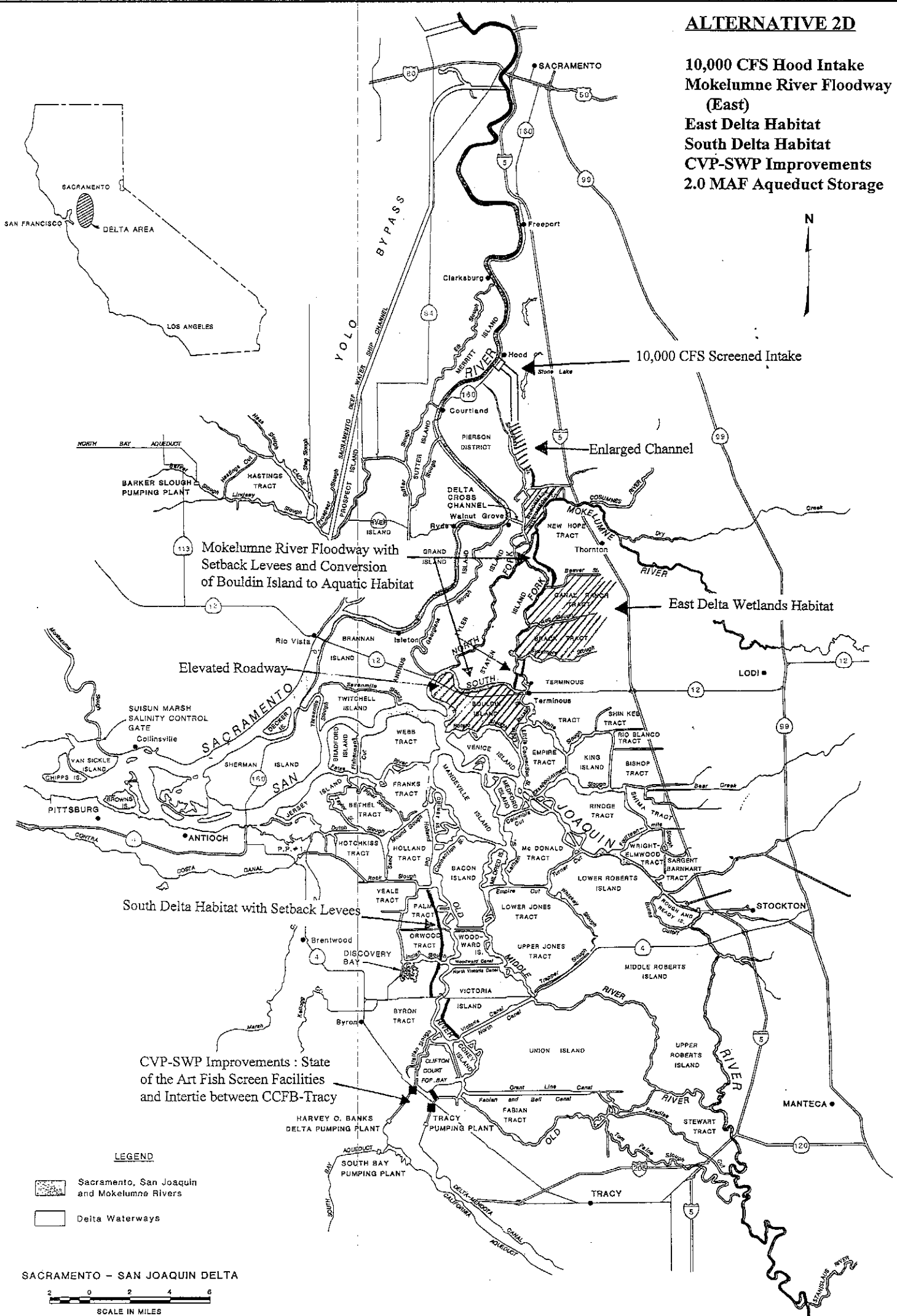
Western 15,000 CFS Isolated
South Delta Intake
Northern 15,000 CFS Isolated
South Delta Intake
Eastern 15,000 CFS Isolated
South Delta Intake
CVP-SWP Improvements

N. Use one at
a time, to
protect
fish.



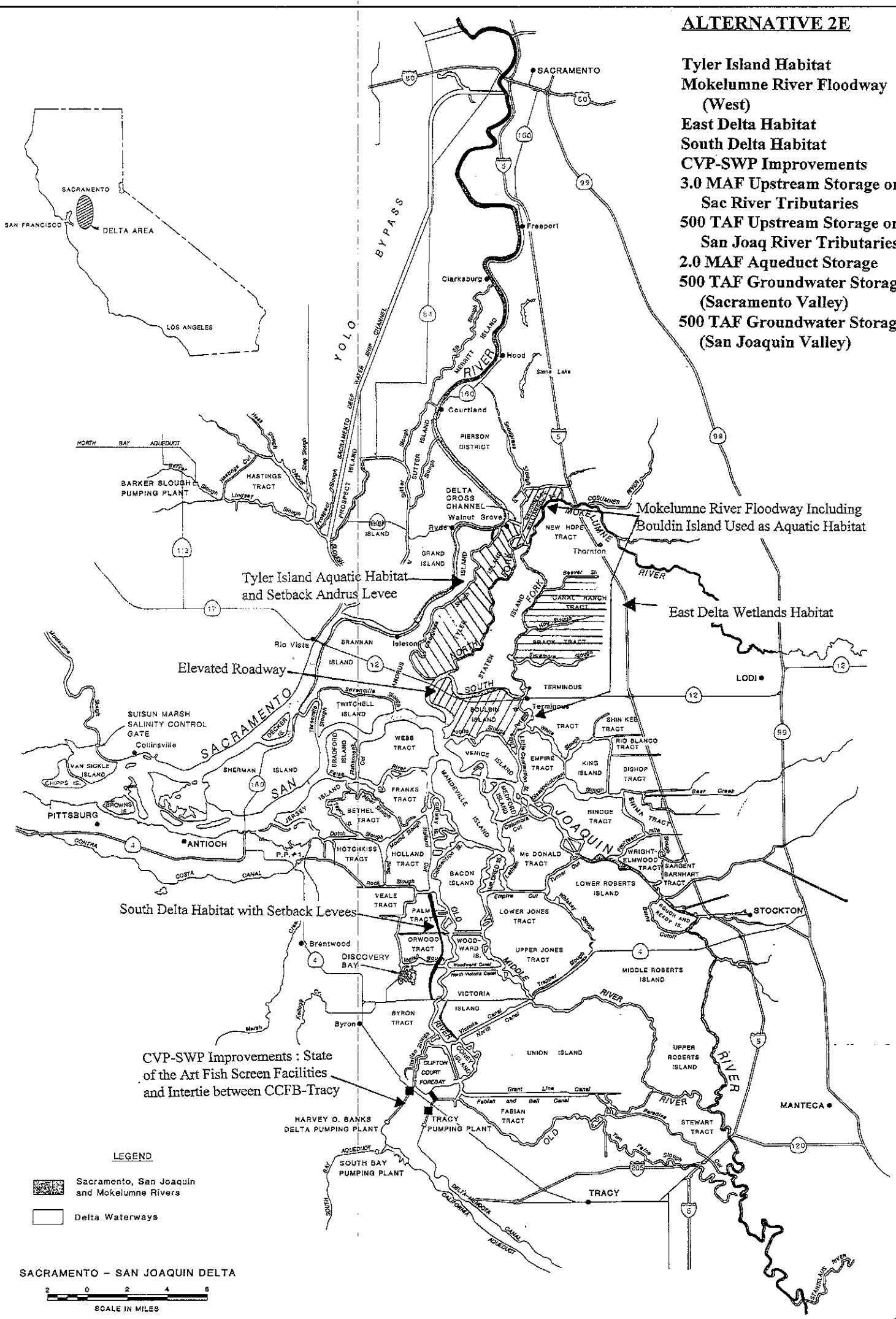
ALTERNATIVE 2D

10,000 CFS Hood Intake
Mokelumne River Floodway
(East)
East Delta Habitat
South Delta Habitat
CVP-SWP Improvements
2.0 MAF Aqueduct Storage



ALTERNATIVE 2E

- Tyler Island Habitat
- Mokelumne River Floodway (West)
- East Delta Habitat
- South Delta Habitat
- CVP-SWP Improvements
- 3.0 MAF Upstream Storage on Sac River Tributaries
- 500 TAF Upstream Storage on San Joaquin River Tributaries
- 2.0 MAF Aqueduct Storage
- 500 TAF Groundwater Storage (Sacramento Valley)
- 500 TAF Groundwater Storage (San Joaquin Valley)

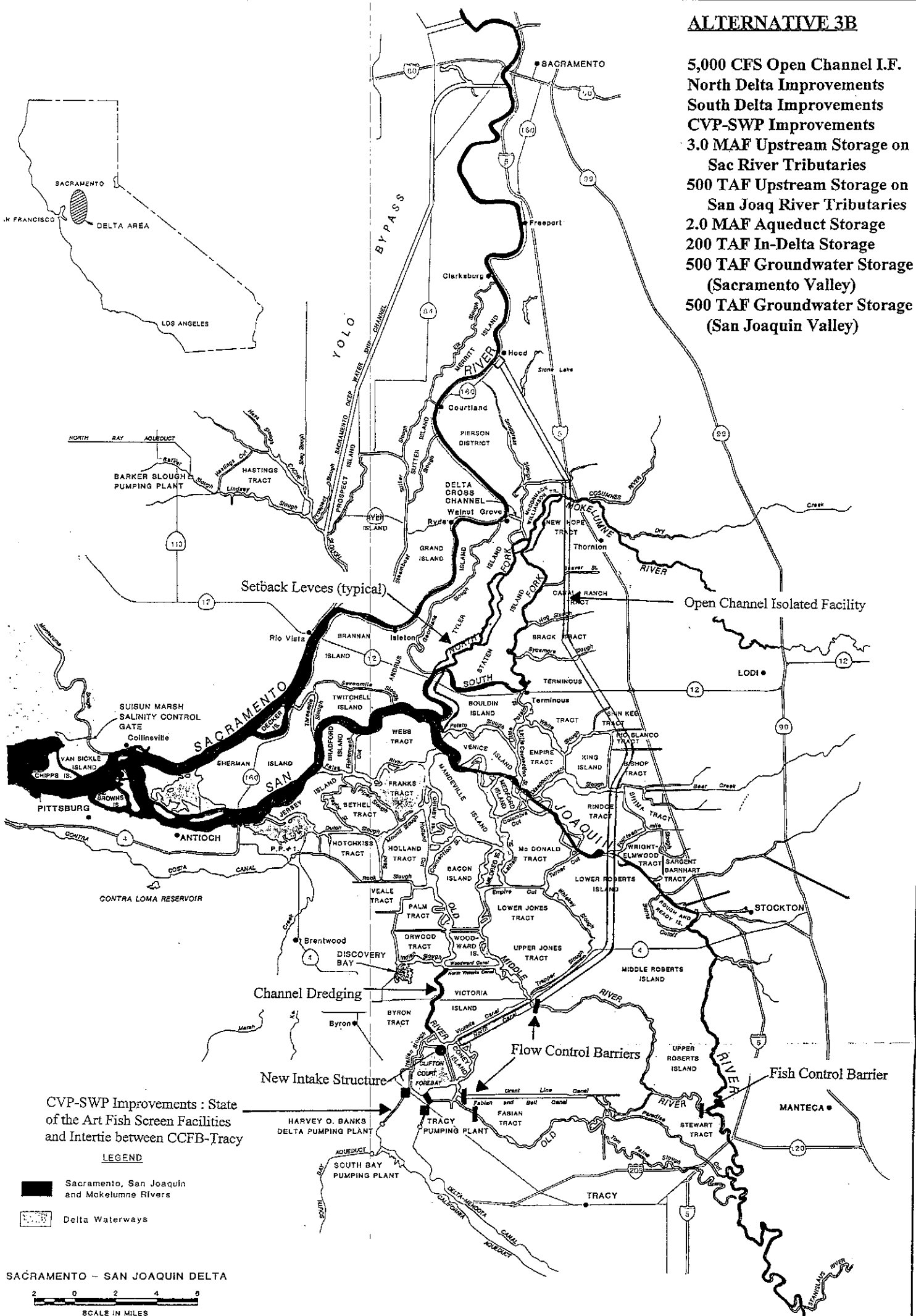


5,000 CFS Open Channel I.F.
North Delta Improvements
South Delta Improvements



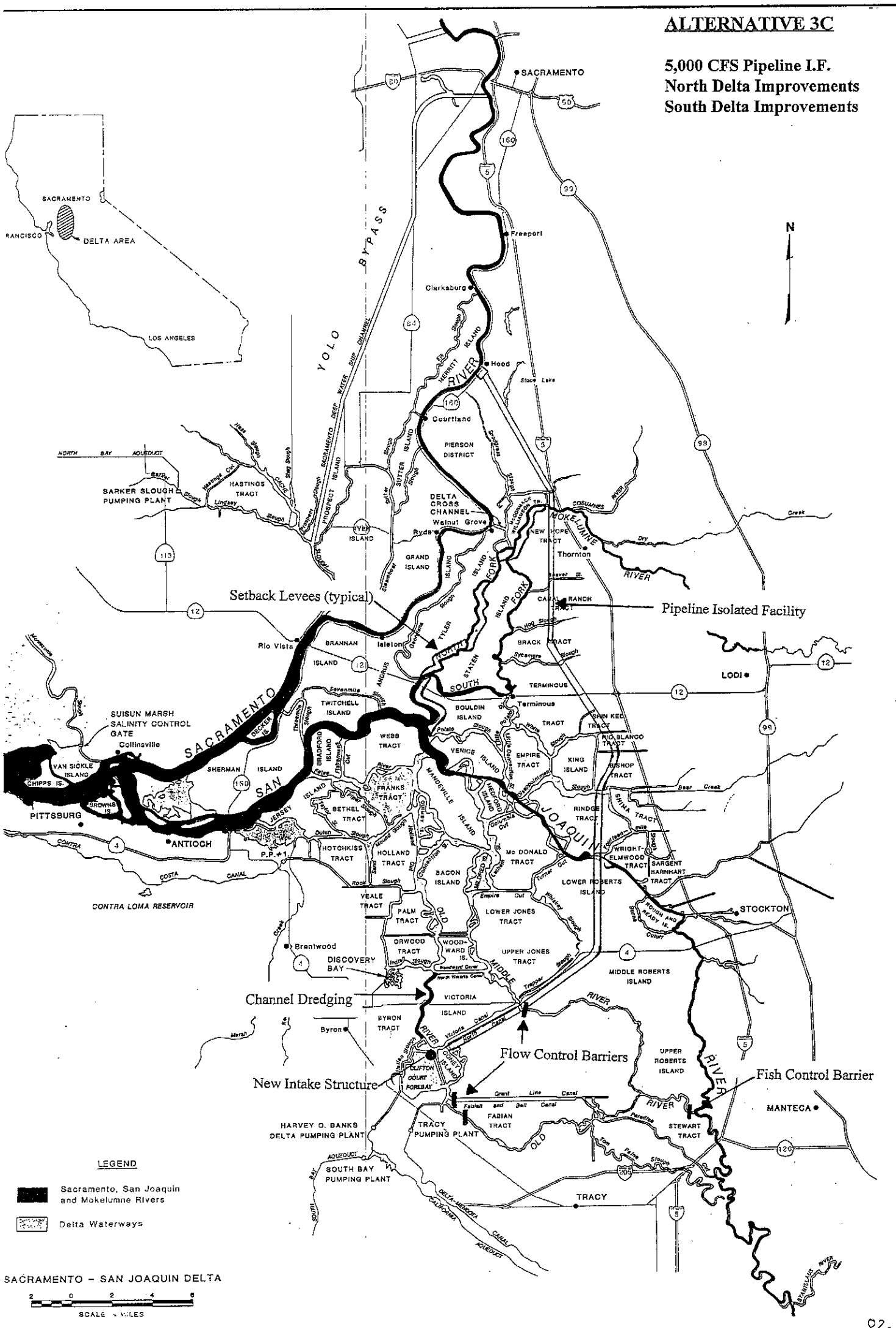
ALTERNATIVE 3B

5,000 CFS Open Channel I.F.
 North Delta Improvements
 South Delta Improvements
 CVP-SWP Improvements
 3.0 MAF Upstream Storage on
 Sac River Tributaries
 500 TAF Upstream Storage on
 San Joaquin River Tributaries
 2.0 MAF Aqueduct Storage
 200 TAF In-Delta Storage
 500 TAF Groundwater Storage
 (Sacramento Valley)
 500 TAF Groundwater Storage
 (San Joaquin Valley)



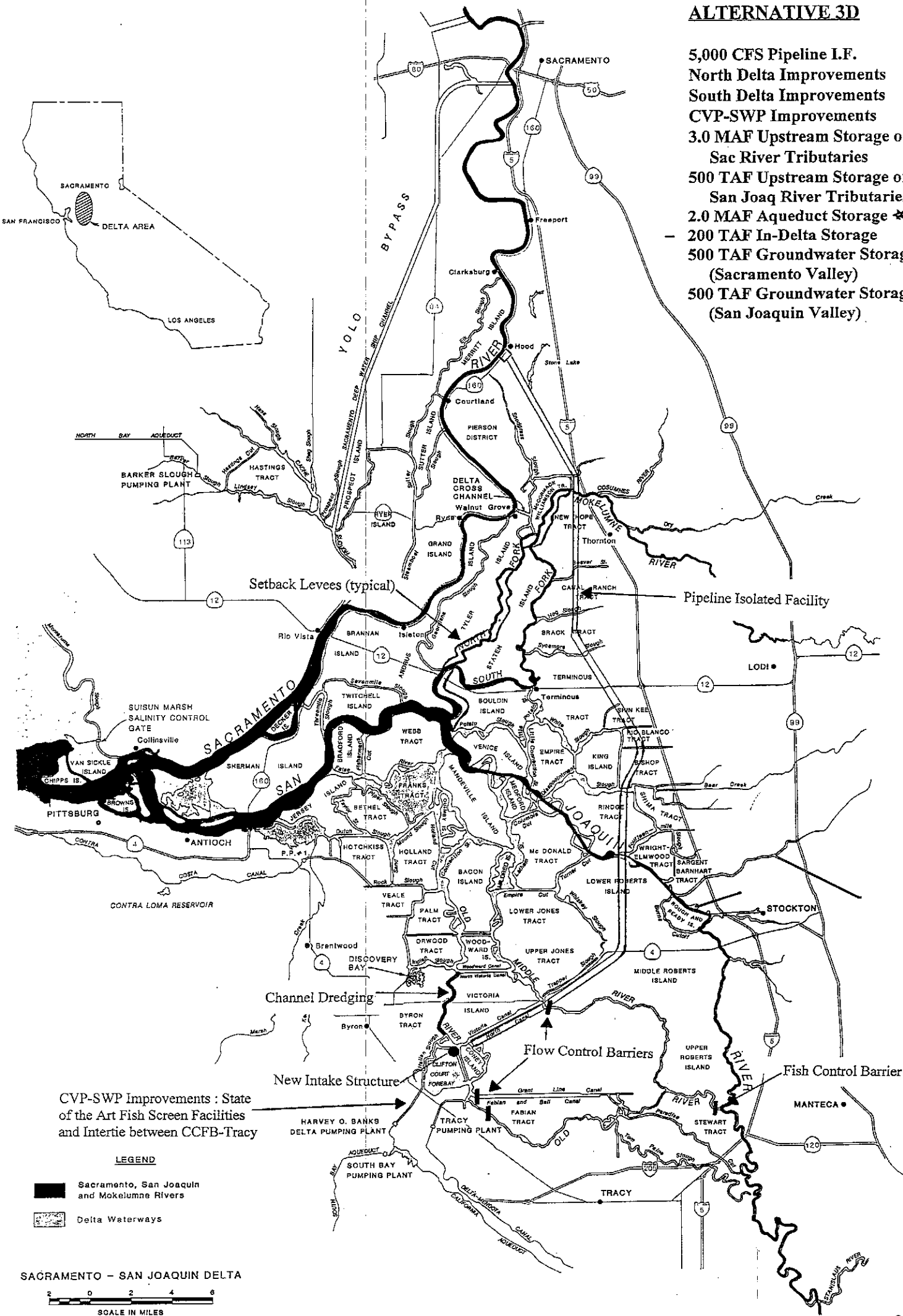
ALTERNATIVE 3C

5,000 CFS Pipeline I.F.
North Delta Improvements
South Delta Improvements



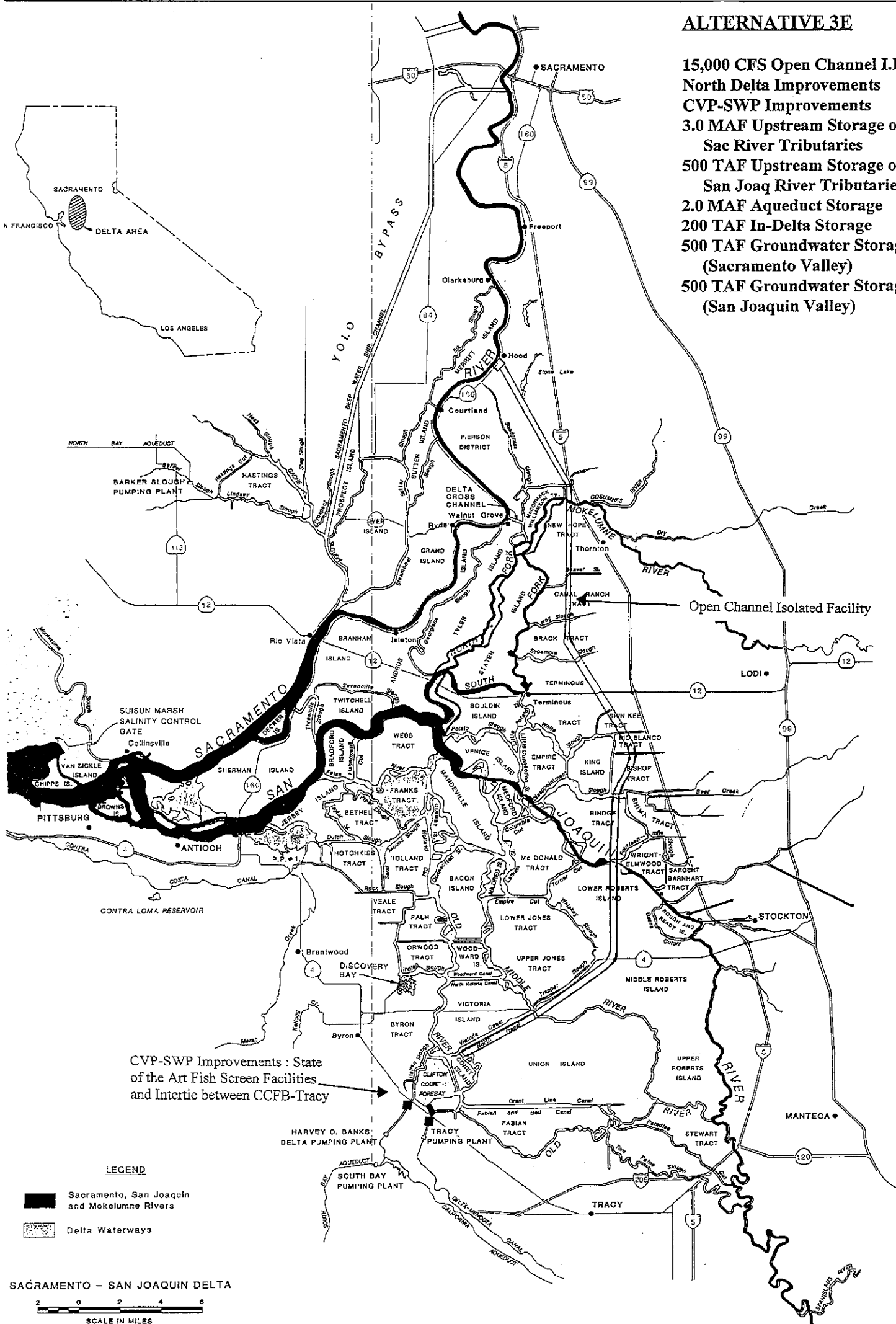
ALTERNATIVE 3D

- 5,000 CFS Pipeline I.F.
- North Delta Improvements
- South Delta Improvements
- CVP-SWP Improvements
- 3.0 MAF Upstream Storage on Sac River Tributaries
- 500 TAF Upstream Storage on San Joaquin River Tributaries
- 2.0 MAF Aqueduct Storage *
- 200 TAF In-Delta Storage
- 500 TAF Groundwater Storage (Sacramento Valley)
- 500 TAF Groundwater Storage (San Joaquin Valley)



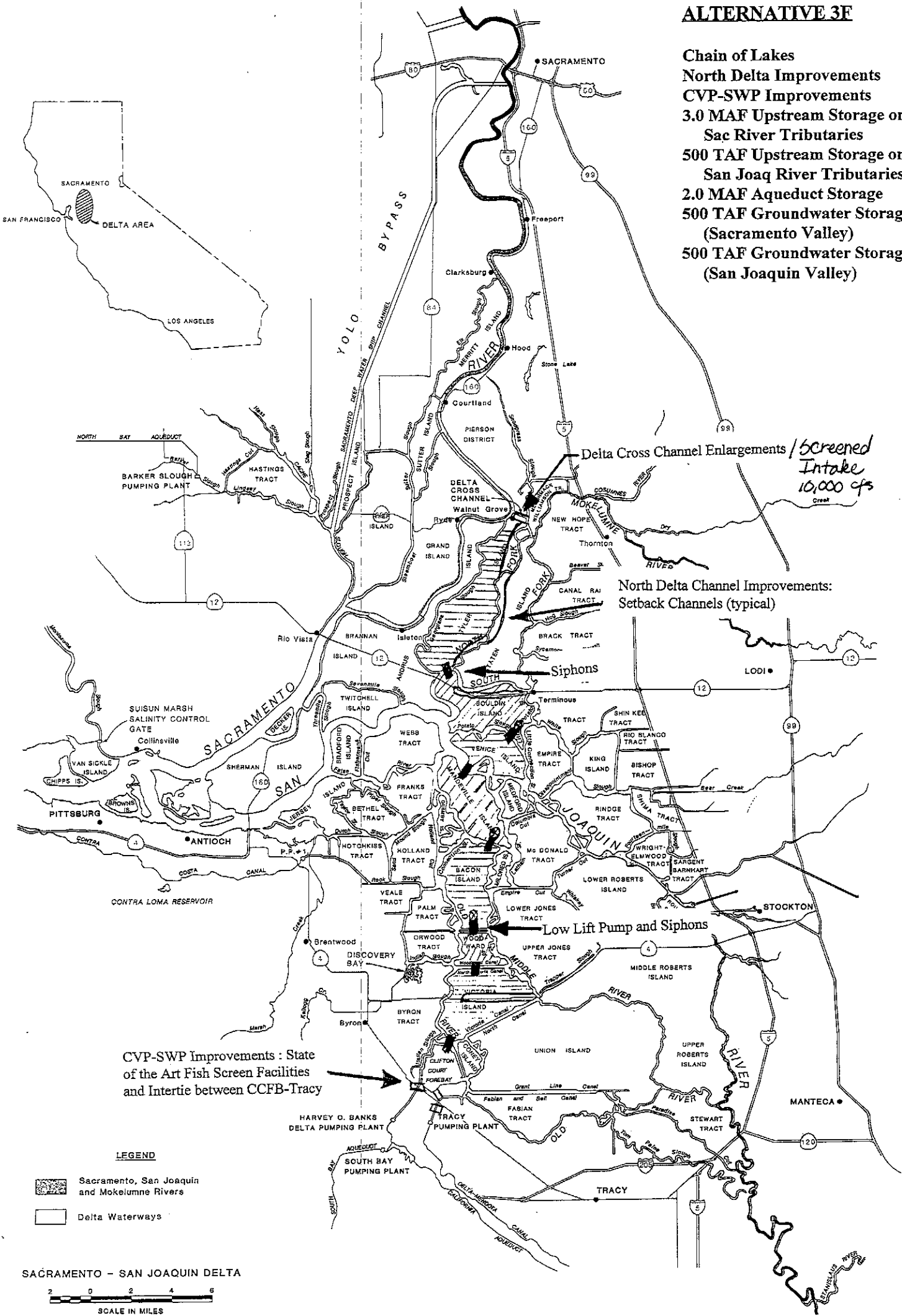
ALTERNATIVE 3E

- 15,000 CFS Open Channel I.F.
- North Delta Improvements
- CVP-SWP Improvements
- 3.0 MAF Upstream Storage on Sac River Tributaries
- 500 TAF Upstream Storage on San Joaq River Tributaries
- 2.0 MAF Aqueduct Storage
- 200 TAF In-Delta Storage
- 500 TAF Groundwater Storage (Sacramento Valley)
- 500 TAF Groundwater Storage (San Joaquin Valley)



ALTERNATIVE 3F

- Chain of Lakes
- North Delta Improvements
- CVP-SWP Improvements
- 3.0 MAF Upstream Storage on Sac River Tributaries
- 500 TAF Upstream Storage on San Joaquin River Tributaries
- 2.0 MAF Aqueduct Storage
- 500 TAF Groundwater Storage (Sacramento Valley)
- 500 TAF Groundwater Storage (San Joaquin Valley)



Documentation in Appendix

**5,000 CFS Screened Deep Water
Ship Channel and West Tunnel
North Delta Improvements
South Delta Improvements
CVP-SWP Improvements
3.0 MAF Upstream Storage on
Sac River Tributaries
500 TAF Upstream Storage on
San Joa River Tributaries
2.0 MAF Aqueduct Storage
200 TAF In-Delta Storage
500 TAF Groundwater Storage
(Sacramento Valley)
500 TAF Groundwater Storage
(San Joaquin Valley)**



5,000 CFS Open Channel I.F.
Tyler Island Habitat
Mokelumne River Floodway
(West)
East Delta Habitat
South Delta Habitat
CVP-SWP Improvements
3.0 MAF Upstream Storage on
Sac River Tributaries
500 TAF Upstream Storage on
San Joa River Tributaries
2.0 MAF Aqueduct Storage
500 TAF Groundwater Storage
(Sacramento Valley)
500 TAF Groundwater Storage
(San Joaquin Valley)

